

MEMO

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Date: March 7, 2011
To: Steve Lester, Western Region
From: Craig Tesch and Dennis Owsley, Hydrology Section, State Office
cc: Sean Vincent and Rick Raymondi
Subject: Technical Review of Orchard Ranch LLC Application #63-32703

Introduction

As requested, the Idaho Department of Water Resources (IDWR) Hydrology Section in the State Office has reviewed the amended water right application submitted for Orchard Ranch LLC to assess potential impacts to Western Snake River Plain (WSRP) aquifers. This review has been conducted to answer the following questions:

- 1) Does the consultant information show an adequate, sustainable ground water supply at the proposed site?
- 2) What impacts would be expected to other wells in the area?
- 3) What impacts to Mountain Home Ground Water Management Area (GWMA) and Cinder Cone Critical Ground Water Area (CGWA) would be expected?
- 4) How does consultant information fit with other information previously provided to and analyzed by IDWR for the general area in question?

Proposal Summary

Orchard Ranch LLC seeks 9.6 cubic feet per second (cfs) of groundwater for the irrigation development of 480 acres within a 2,751.7 acre permissible place of use (POU) on the Mountain Home Plateau (Figure 1). An annual diversion limit was not stipulated within the application; however, the IDWR Western Region memo accompanying the amended permit application dated September 27, 2010, anticipates a diversion volume of 1,920 to 2,160 acre-feet (af) annually.

The proposed irrigation development is located in the same geographic area as several other proposed large-scale residential developments, and is bisected by the administrative boundary developed by IDWR that separates Basins 61 and 63. The Orchard Ranch POU also straddles the Mountain Home Ground Water Management Area (GWMA) boundary; however, the four proposed points of diversion (POD) are in Basin 63 outside the GWMA boundary (Figure 1). The four proposed PODs are wells that would supply water to mainlines and pivots from an anticipated production depth between 800 and 1,200 feet below ground level (ft-BGL).

The proposed POU is located at T01S R03E Sections 9, 10, 11, 12, 13, 14, 15, 23, 24 and T01S T04E Sections 19, 20, 29, Ada County, and is partly within the Mountain Home GWMA. The proposed POU is approximately five miles west of the Cinder Cone Critical Ground Water Area (CGWA) and 10 miles south of the Southeast Boise GWMA. The proposed PODs are approximately 6-7 miles west of the Cinder Cone Critical Ground Water Area (CGWA) and 10 miles south of the Southeast Boise GWMA.

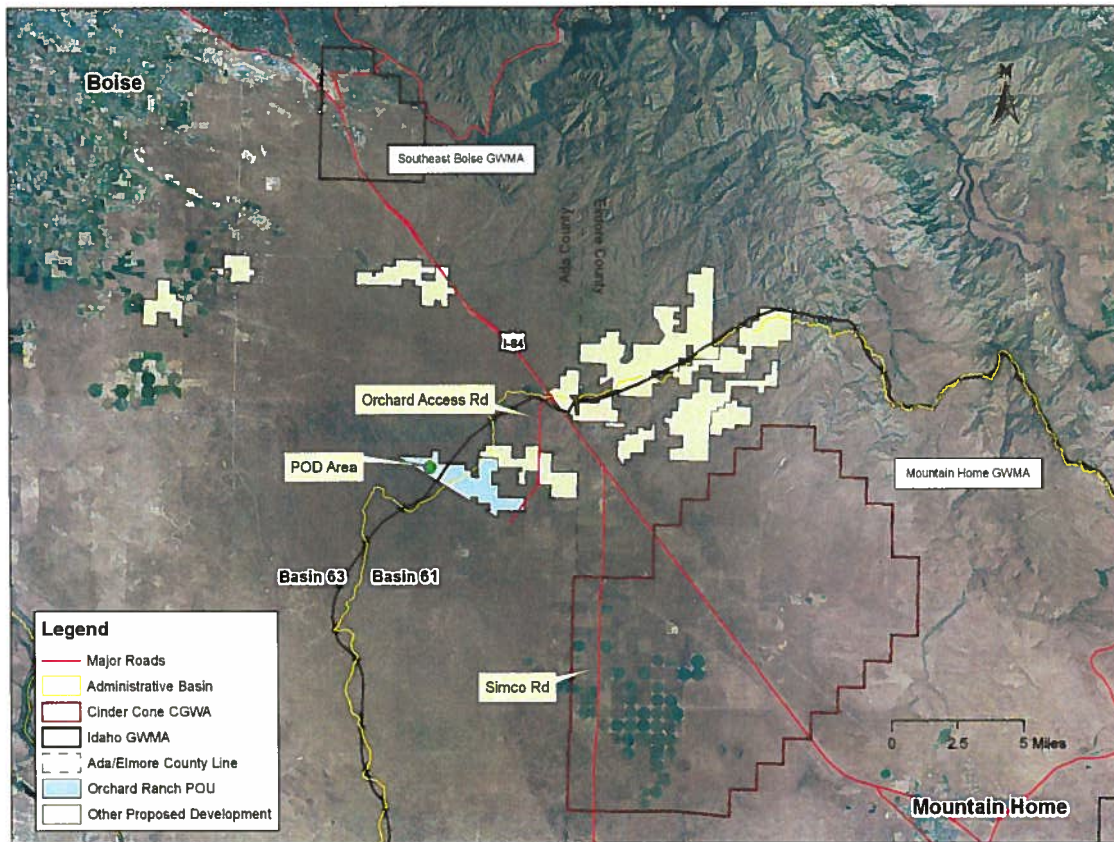


Figure 1. Location of the Orchard Ranch LLC proposed irrigation development POU and area of the four proposed PODs (green dot).

Local Hydrogeology

The WSRP is a deep structural depression that is filled with sedimentary and volcanic rocks of Tertiary and Quaternary age that is bounded by northwest trending faults (Newton, 1991). Mountains composed of granitic and volcanic rocks surround the plain on the northeast and southwest (Figure 2). The hydrogeology of the area is complex and has not been extensively studied; however, a hydrogeologic investigation as part of the Treasure Valley Comprehensive Aquifer Management Planning (CAMP) process is in progress. The regional aquifer targeted by this application is found primarily in the Bruneau Formation, a unit in the Idaho Group that consists of fluvial-lake deposits, layers of ash, and basaltic lava flows (Ralston, 1968). Two northwest trending faults have been mapped north of the proposed development (Bond, 1978). Perched aquifers exist beneath the Mountain Home Plateau east of the proposed development (Young, 1977). The general groundwater flow direction in the regional aquifer is to the southwest towards the Snake River (Figure 3).

Recharge to the regional aquifer is from downward flow from the perched aquifers, precipitation from the uplands to the north, and underflow from the north (Harrington and Bendixsen, 1999). There does not appear to be a perched aquifer in the vicinity of the proposed POU so recharge sources most likely are limited to precipitation and underflow from the uplands to the north.

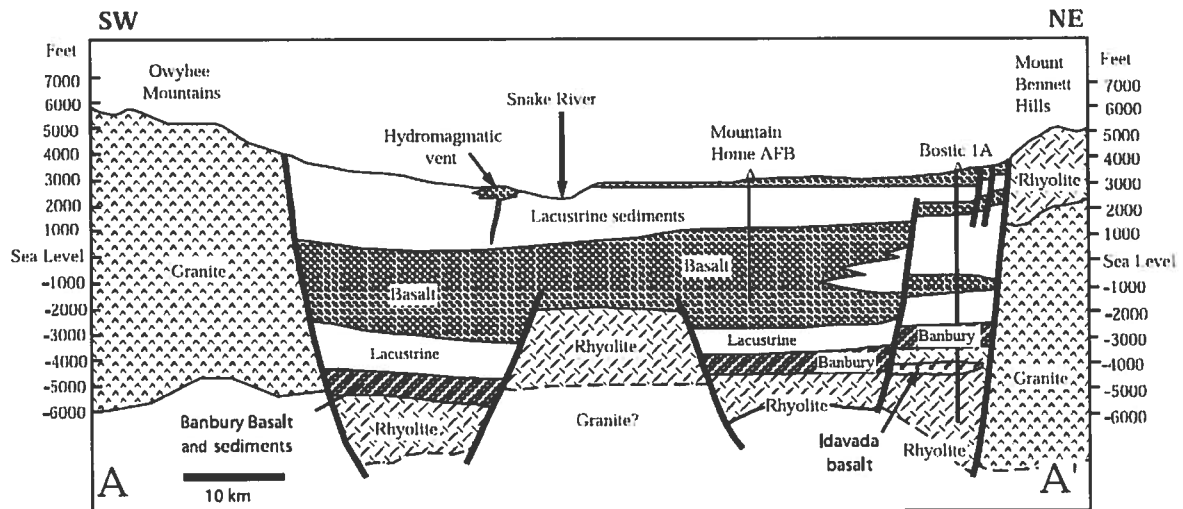


Figure 2. Geologic cross-section through the WSRP (Shervais, 2002).

Orchard Ranch LLC retained SPF Water Engineering to develop the hydrologic information packet in support of their application. A large number of well drilling reports from the area were included and describe a sequence of shallow sediments, volcanic materials, and additional sediments at depth.

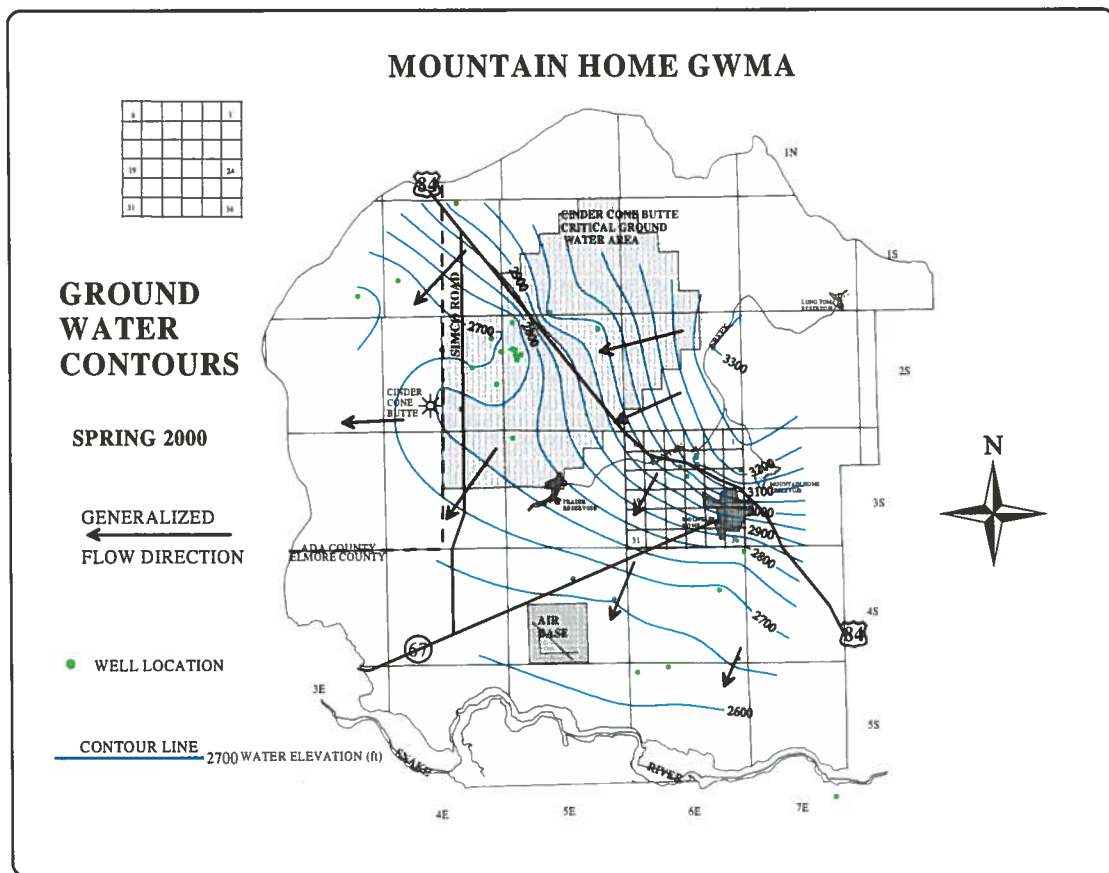


Figure 3. Water level contours and inferred flow direction for the Mountain Home GWMA (Harrington, 2001).

SPF (2007) summarizes water levels and aquifer zones in the area as follows:

“The target aquifers underlying the proposed Orchard Ranch Planned Community include a series of saturated sand layers (with minor amounts of gravel) at depths ranging from 600 feet to over 800 feet. Wells penetrating these zones will likely extend to depths ranging from 700 to 900 feet or more. Volcanic materials in some portions of the property may extend to these depths, in which case target aquifers will include broken basalt or cinder zones.” (p. i)

“Static water levels listed on the driller’s reports ranged from approximately 450 to 550 (*sic*). Water levels in most of the deeper wells rise above the zone in which ground water was encountered, indicating confined or partially confined conditions.” (p. 6)

“Aquifer zones were noted at depths ranging from about 450 to over 700 feet. One well (the 800-foot deep Well No. 48) did not extend beyond volcanic rocks; primary water producing zones were noted between about 450 and 800 feet.” (p. 8)

“Aquifer capacity in the Orchard Ranch area will likely be moderate, with potential discharge rates ranging from about 500 to 1,000 gpm. One of the M.A.T.E.S. wells in the area was initially tested at a flow of 815 gpm.” (p. 16)

A review of geologic logs for wells near the proposed development supports the SPF descriptions above; however, it is important to note that variability can exist locally in the region. For example, the boring for a deep well at the Boise Stage Stop, approximately three miles to the northeast in T01N R04E Section 32, penetrated 884 feet of sediments from land surface to completed depth with no volcanics present. Alternatively, geologic logs for several shallow wells at the Boise Stage Stop with static water levels less than 120 ft BGL indicate the presence of volcanics. Data deficiencies related to geology, groundwater elevations, and aquifer extent exist in this portion of the WSRP and are the focus of ongoing studies by IDWR.

IDWR has maintained and monitored a groundwater level monitoring network on the Mountain Home Plateau since 1960. The monitoring network includes wells within the Mountain Home GWMA and the Cinder Cone CGWA. Significant water level declines measured in wells in this network resulted in the establishment of the Cinder Cone CGWA (May 7, 1981) and the Mountain Home GWMA (November 9, 1982).

Water level data from wells in the Mountain Home network that were collected during the spring between 1983 and 2009 were recently compared by IDWR in order to determine water level trends (Figure 4). Water levels in 13 of the 19 wells (68%) were lower in spring 2009 than water levels measured in the spring of 1983. These thirteen wells show water level decreases ranging from 0.1 to 80 feet; declines greater than 50 feet were observed in five wells located in the southwest portion of the Cinder Cone CGWA.

Six of the nineteen wells (32%) show a rise in water level, and are primarily located northeast of the interstate. The increases range from 1 to 13 feet. The proposed POU and PODs are located in the vicinity of increasing water levels. The cause of differing trends in the area is poorly understood, and significant uncertainty exists due to a lack of hydrologic data in this area.

Technical Review Questions

Responses to each of the four questions posed in the introduction and included in the request for analysis are presented below.

Question 1

- Does the consultant information show an adequate, sustainable ground water supply at the proposed site?

In contrast to the report developed by SPF in support of the water right application for the nearby Nevid residential development, SPF did not attempt to quantify water availability at the proposed site. SPF did not calculate a water budget or predict hydrologic impacts that would result from the proposed pumping. Instead, the consultant supports their conclusion that water is available for appropriation by discussing water level trends in area wells. SPF (2007, p. i) states that “Ground-water levels in the Orchard Ranch vicinity have been relatively stable water levels (*sic*) over the last 30 to 40 years.” It is important to note, however, that large water level declines have been experienced nearby in the Cinder Cone CGWA and Mountain Home GWMA (Figure 4). SPF (2007, p. 11) acknowledges water level declines approximately 6.5 miles to the south/southeast in the Cinder Cone CGWA: “The remaining three wells...show water level declines ranging from approximately 1 foot per year to approximately 2.5 feet per year.”

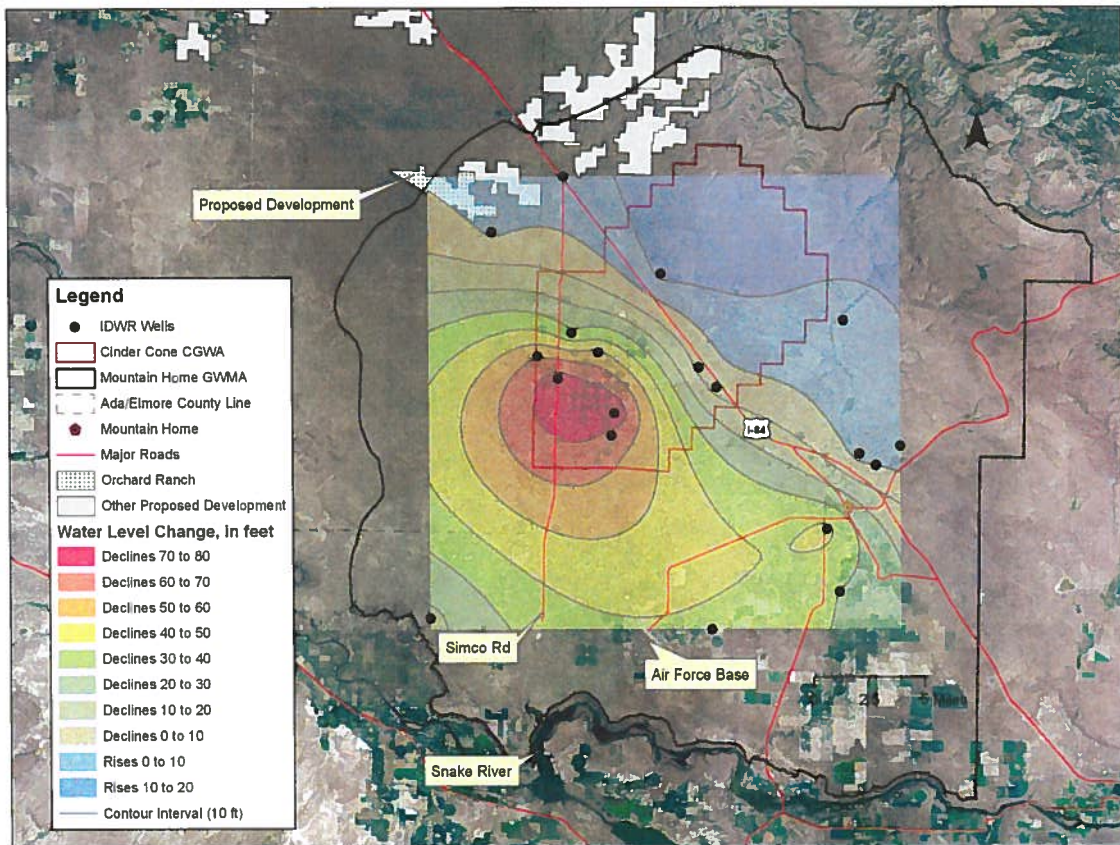


Figure 4. Water level change from 1983 to 2009 within the IDWR Mountain Home monitoring network area.

The source for differing trends in the area is currently unknown. Irrigation development near Simco Road in the southwestern portion of the CGWA is potentially a major contributor to declines in the area; however, northwest-trending faults mapped in the area

(Bond, 1978) may serve as partial barriers to flow and contribute to the difference in trends between wells north/northeast of I-84 and those south/southwest of I-84. Barriers can serve to increase drawdown from pumping and to limit aquifer recharge.

Orchard Ranch is downgradient of the capture area (Figure 5) for the Elk Creek Canyon-Sterling Sage residential development (also referred to as Nevid) that was recently granted a water right appropriation of 345 af (annual volume limit) and a 4.02 cfs maximum diversion rate (IDWR, 2009). In the final order it was determined that 811 af/year of recharge entered the area near the boundary and “A reduction in the minimum recharge estimate of 811 acre-feet to a lesser water availability of 345 acre-feet is reasonable given the factors that would prevent Nevid from capturing all the water recharged to ground water.” Subtracting the 345 af/yr appropriation from upland recharge results in 466 af/yr of outflow from the Nevid area. The IDWR Western Region memo accompanying the amended permit application for Orchard Ranch dated September 27, 2010, anticipates a diversion volume of 1,920 to 2,160 af annually and a maximum diversion rate of 9.6 cfs (6,955 aft/yr), both which exceed outflow from the Nevid area.

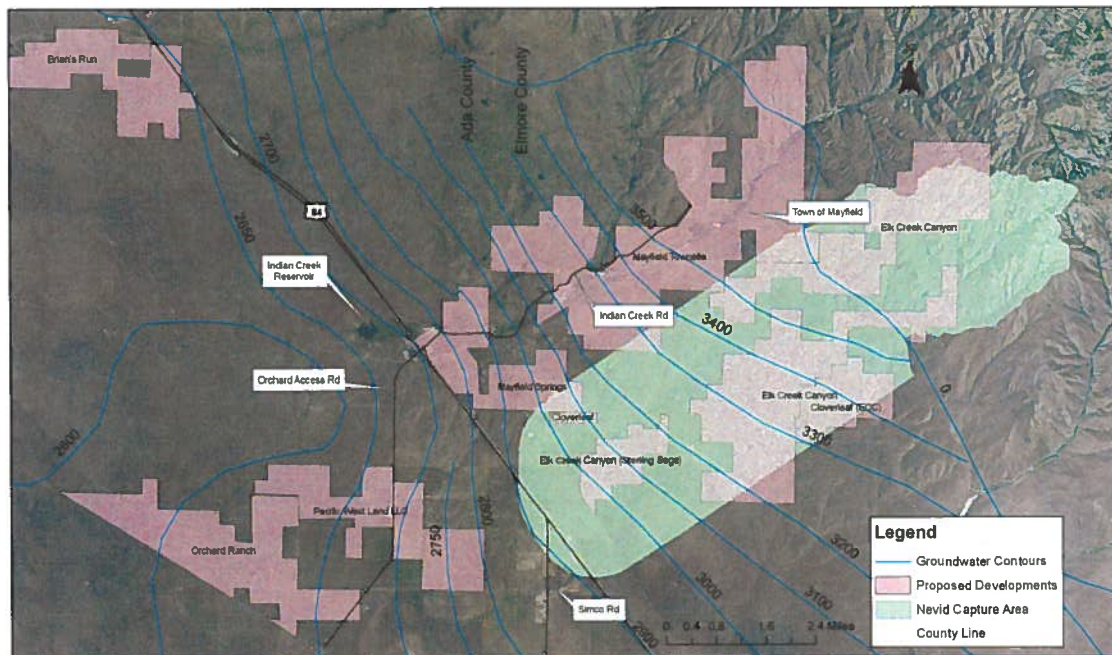


Figure 5. Location of the Orchard Ranch proposed POU relative to the SPF-calculated capture area for Elk Creek Canyon-Sterling Sage (referred to as the Nevid capture area), regional groundwater contours, and other proposed developments.

The consultant suggests that the long term sustainability of the aquifer will be best determined through increased groundwater pumping coupled with detailed monitoring. However, statements in SPF documents suggest that groundwater production in the area

will be constrained by low recharge in the upgradient areas. SPF (2007) states the following:

“The long-term sustainable production capacity in this area is unknown. Large increases in ground-water production will likely be constrained by low recharge in upgradient areas.” (p. i)

“Structural controls (e.g. faulting) may limit ground-water flow into the general Orchard Ranch area” (p. i).

Based upon information available, it appears that the long term sustainability of the aquifer in this area is limited. As stated in the Nevid final order, “Because there is limited recharge to the public ground water resource, limited appropriations of water will protect and conserve the limited supply for the anticipated future domestic and municipal uses of water” (IDWR, 2009).

Question 2

- What impacts would be expected to other wells in the area?

In response to a request from IDWR to investigate potential impacts to existing wells, SPF identified seven wells within one mile of the property boundary. SPF determined that there are no appropriated springs within one mile of the boundary, and none of the wells are within one mile of the proposed points of diversion. SPF did not attempt to quantify impacts to other wells in the area, and SPF did not predict drawdown from proposed pumping.

Question 3

- What impacts to Mountain Home Ground Water Management Area and Cinder Cone Critical Ground Water Area would be expected?

The proposed POU for this application is within the northwestern edge of the Mountain Home GWMA, approximately five miles west of the Cinder Cone CGWMA and 10 miles south of the Southeast Boise GWMA. The proposed PODs are outside the Mountain Home GWMA, but within 1.4 miles of the boundary. Pumping in close proximity to the boundary could result in water level declines propagating into the GWMA. Water level declines at Orchard Ranch may occur in a similar manner to those in the adjacent management areas because hydrogeologic conditions appear to be similar across administrative boundaries.

As previously mentioned, significant groundwater declines have occurred in the southern portion of the Cinder Cone GWMA; however, stable/increasing trends exist near and northeast of I-84. Stable or rising water levels are SPF’s primary support for a sufficient

water supply although groundwater availability was not quantified. From the letter supporting the amended permit application dated February 24, 2009, SPF states:

“Although the administrative boundary of the MHGWMA has not been revised as recommended by the Working Group, stable groundwater levels in the vicinity of the Orchard Ranch project indicate that there is some groundwater available for appropriation at this location.” (p. 5)

Reasons for the stable water levels in the northern portion of the management areas are not fully understood. Potential explanations for stable/increasing trends include:

1) Current withdrawals in the northern portion of the management area may not exceed recharge rates.

The current lack of stress on the aquifer in this particular area may explain the stable or rising water levels in the northern portion of the management area. As shown in Figure 6, less than one percent of the pumping within the Mountain Home GWMA occurs in the northern portion of the management area. There are seven water rights within three miles of the Orchard Ranch property boundary with a combined maximum diversion rate of 1.83 cfs. Orchard Ranch’s proposed appropriation of 9.6 cfs represents a 425% increase in potential withdrawals in that area.

It is unknown how the aquifer will respond to an increased stress, but it is reasonable to assume that the aquifer could respond similarly to what has occurred in the southern portion of the management area and in the southeast Boise area.

2) The management area’s southwestern portion may have limited hydraulic connection to the northeastern portion due to groundwater flow impediments, such as faults.

Northwest-trending faults mapped in the area (Bond, 1978) or other structural features may serve as partial barriers to flow and contribute to the difference in trends between wells north/northeast of I-84 and those south/southwest of I-84. Partial barriers to flow would likely result in increased drawdown from nearby pumping and reduction of recharge to the area. As noted by SPF (2007), “Normal faulting along the northern boundary of the Western Snake River Plain is typically distributed over a zone several miles wide. Two general fault zones are noted in Figure 3” (p.5) and “ground-water flow rates into aquifers underlying the Orchard Ranch property may be limited by upgradient structural controls (e.g., faulting)” (p. 17).

To further evaluate hydraulic communication between the northern and southern portions of the management area would require a large scale hydrogeologic investigation, outside the scope of this water right application.

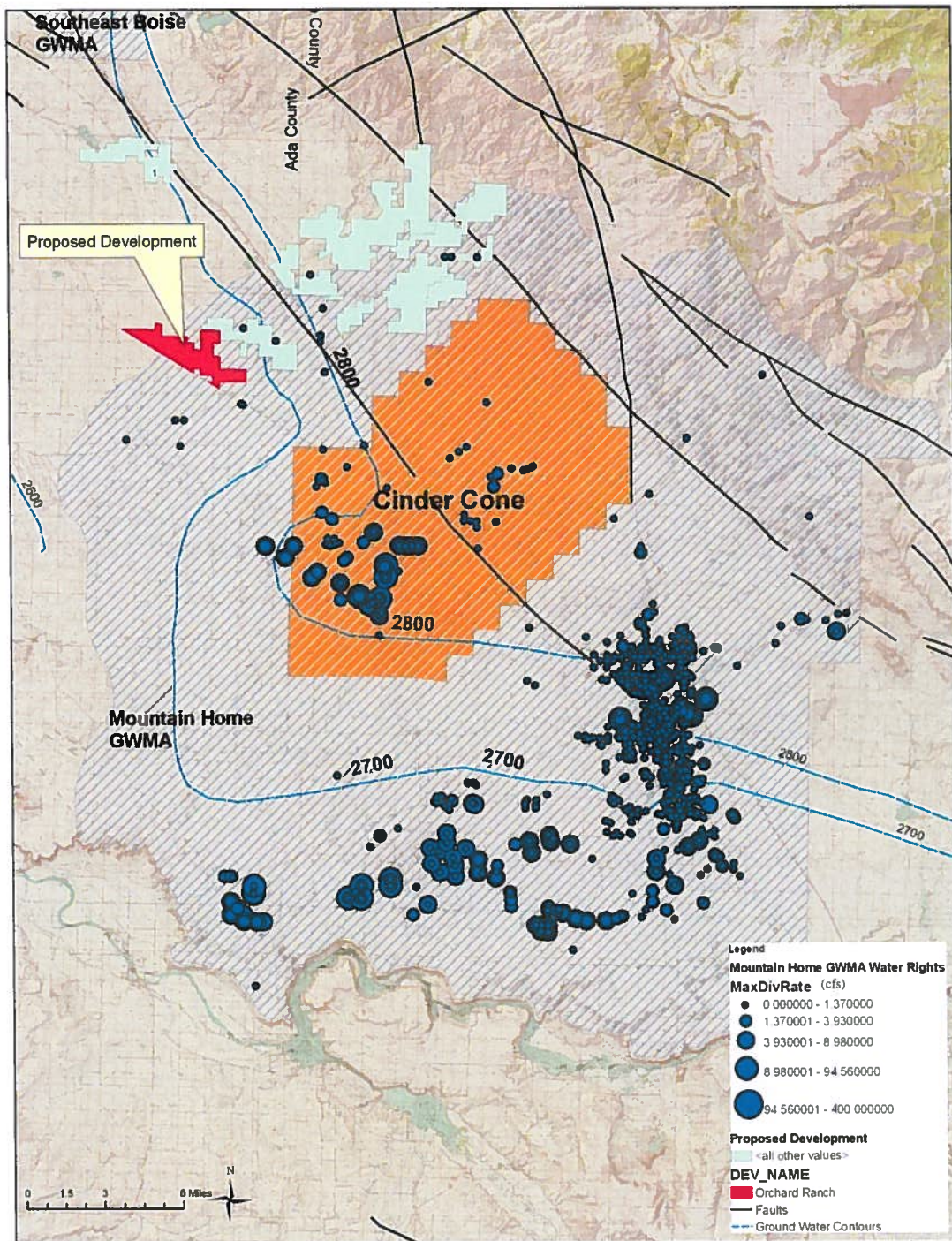


Figure 6. Water rights and groundwater flow contours in the Mountain Home GWMA.

SPF suggests that the area's groundwater sustainability is ultimately limited by low amounts of recharge in the area. While SPF postulates that some groundwater is available for appropriation, they also acknowledge that "limited recharge rates in this area will likely constrain large-scale water development" (SPF, 2007, p. 17). The primary source of recharge to this area is precipitation that falls in the uplands area north of the Mountain Home Plateau. Orchard Ranch is located between the upland recharge area to the north and any current groundwater users to the south/southwest. The groundwater flow direction is to the south/southwest, indicating that water pumped at the proposed locations would intercept recharge from the north and reduce the amount of flow into portions of the Mountain Home GWMA to the south/southwest. Depending on hydraulic connectivity, this flow reduction could result in water level declines.

Question 4

- How does consultant information fit with other information previously provided to and analyzed by IDWR for the general area in question?

The Department has reviewed three other water right applications in the area of this proposal. The following section contains quotes, highlights, and conclusions from each of the applicant's hydrologic supporting reports submitted to IDWR.

Intermountain Gas and Sewer #63-32225 (03/20/2006) – Approved for 10 cfs

- 7,900 – 31,900 acre-feet (10.9 – 44 cfs) available for appropriation.
- "Stable water levels suggest that water is available for appropriation."
- "Little or no impact on existing water rights and water users are anticipated as a result of proposed new diversions for the Mayfield Springs Planned Community. The preceding water budget analysis suggests that there is ample water supply for existing and proposed uses."

Mayfield Townsite #63-32499 (10/01/2007) – Protested

- 3,430 – 28,960 acre-feet (4.7-40 cfs) available for appropriation.
- "Additional ground water is available for appropriation in the Mayfield Townsite property area. This opinion is based on estimated recharge in excess of current uses and on steady (or slightly rising) water levels in this area (stable water levels suggest that ground water is available for appropriation)."
- "The ultimate carrying capacity of aquifers in the Mayfield Townsite area is unknown."
- "As with many aquifers, the best way for determining ultimate ground-water availability is to begin development while carefully monitoring ground-water level responses."

- “The ultimate ground-water supply in the Mayfield area is limited.”
- “Excessive ground water declines and/or insufficient supply will require the development of an alternative water supply for full buildout of the Mayfield Townsite project.”

Nevid #61-12090 (03/30/2009) – Approved for 4.02 cfs

- 2,400 – 8,400 acre-feet (3.3 -11.6 cfs) available for appropriation.
- “Additional ground water is available for appropriation in the Mayfield Townsite property area. This opinion is based on estimated recharge in excess of current uses and on steady (or slightly rising) water levels in this area (see Figure 5 in SPF 2007b).”
- “We anticipate minimal impacts to existing wells as a result of the proposed withdrawals under application 61-12090.”
- “Potential water level declines will be significantly less than the 10 feet shown in Figure 3 because of recharge in the Elk Creek Village area.”

Like each of the previous submittals, the current application emphasizes that stable or slightly increasing water levels exist in the area. As previously described, there is large uncertainty because reasons for the stable or increasing water levels are poorly understood.

SPF did not produce a water budget for this application, which was included in previous submittals and was used to estimate the amount of water available for appropriation in the area. Without a quantifiable water budget, large uncertainty exists in IDWR’s determination of the current water available for appropriation.

Finally, this application did not quantify potential drawdown associated with pumping of this right as was done in previous applications. This information was requested by IDWR in a letter dated November 5, 2008, in which the department asked the applicant to “Document the likelihood of injury to existing wells within a one-mile radius – instead of ½ mile radius – of the proposed points of diversion.”

Conclusions

Based on the information provided in support of this application, and the information reviewed for previous applications in this area, the sustainability of the aquifer with additional large-scale development appears limited. As stated by SPF (2007):

“The long-term sustainable production capacity in this area is unknown. Ground-water recharge in this area is limited by relatively low precipitation rates in upland areas north and northeast of the site. Furthermore, ground-water flow rates into aquifers underlying the Orchard Ranch property may be limited by upgradient

structural controls (e.g., faulting). Even if aquifer capacity is moderate (evidenced by wells with moderate withdrawal rates) limited recharge rates in this area will likely constrain large-scale water development.” (p. 17)

Orchard Ranch LLC, downgradient of Nevid, seeks an approximate diversion volume of 1,920 to 2,160 af/yr. The final order for Nevid water right #61-12090 determined that recharge to the Nevid area is 811 af/yr and that Nevid was entitled to a water right with an annual volume limit of 345 af/yr. Subtracting the 345 af/yr appropriation from upland recharge (811 af/yr) results in 466 af/yr of outflow from the Nevid area, which is less than the amount being sought under application #63-32703 in the name of Orchard Ranch.

There currently are three protested applications for groundwater development in the vicinity of Orchard Ranch that are senior in priority to application #63-32703: Mayfield Townsite application #63-32499, with a maximum diversion rate of 10.0 cfs, and Nevid (Elk Creek Canyon) applications #61-12095 (5.0 cfs) and #61-12096 (20.48 cfs). All the developments that would be supported by these applications are upgradient of the proposed Orchard Ranch development. In addition, Orchard Ranch transfer application #73834 (11.36 cfs) is senior in priority to application #63-32703, and would retire irrigation rights in the CGWA to move them to the proposed POU in this review. The above four senior priority applications are in an area of limited recharge.

Additional factors to consider when reviewing this application include:

- Stable or increasing water levels exist in the area; however, the reason for these trends is poorly understood.
- Proposed PODs are within 1.4 miles of a GWMA and 6-7 miles from a CGWA.
- Pumping has not occurred for two previous water right applications that have been approved and referenced in this memo (#63-32225 and #61-12090). Aquifer responses to these new water rights are unknown and should be monitored when pumping commences.
- The applicant did not analyze the potential cumulative impacts of the four senior priority applications.
- The applicant did not provide water budget calculations or pumping drawdown predictions for review.
- SPF Water Engineering is proposing to stress the aquifer over a 3-year period for the nearby Nevid development using the water supply bank. This would provide an opportunity to evaluate impacts from pumping using real data.

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